

Measurement and Assessment of Flow Quality in Wind Tunnels, Phase I

Completed Technology Project (2007 - 2007)



Project Introduction

With increased commercial competition, great pressure is being applied to effect aerodynamic design changes that will improve fuel economy and performance. But, for example, as we are now concerned with small changes in drag count, potential sources of improvement are much more likely to be masked by poor flow quality. We may have reached the stage where the lack of suitable facility flow quality will hinder and dictate the rate of progress of ground based testing. Few measurements have been made in the Nation's wind tunnels, and in those cases, large discrepancies have been found between full-scale and predicted performance. Consequently, there is an urgent need for in-situ measurements to measure flow quality and the performance of turbulence and noise suppression devices. To meet these challenges, a unique research program is proposed to clarify and alleviate the aerodynamic problems associated with adverse wind tunnel flow quality. It combines innovative advances in data base assessment and management, and new approaches to turbulence instrumentation and analysis. Standardized turbulence measurement techniques and data analysis procedures will be established and used to document the flow quality in our major test facilities.

Anticipated Benefits

Potential NASA Commercial Applications: Measurements are urgently needed in the Nation's major facilities if we are to successfully combat the ever increasing European test facility challenge. Wind tunnel disturbances must be measured to the highest accuracy to allow the aerodynamicist to distinguish between aerodynamic, aeroelastic, and Reynolds number effects. Measurements will help provide U.S. companies with superior test capabilities at competitive cost and so help attract a viable customer testing base that will be required for cost effective facility operations. This state-of-the-art turbulence testing capability available to support commercial aerospace needs meets two of the three main goals of NASA's Aeronautics Test Program (ATP) for corporate management of Aeronautical facilities namely: to "increase the probability of having the right facilities in place at the right time" and to "operate those facilities in the most effective and efficient manner."



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Langley Research Center (LaRC)

Responsible Program:

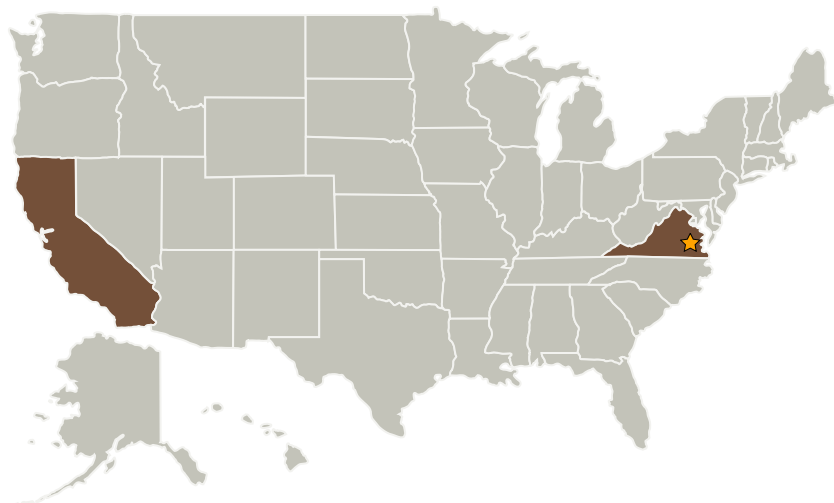
Small Business Innovation Research/Small Business Tech Transfer

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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Langley Research Center (LaRC)	Lead Organization	NASA Center	Hampton, Virginia
Complere, Inc.	Supporting Organization	Industry	Pacific Grove, California

Primary U.S. Work Locations

California	Virginia
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Project Transitions

 **January 2007:** Project Start

 **July 2007:** Closed out

Closeout Summary: Measurement and Assessment of Flow Quality in Wind Tunnels, Phase I Project Image

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

F. Kevin Owen

Technology Areas

Primary:

- TX13 Ground, Test, and Surface Systems
 - └ TX13.2 Test and Qualification
 - └ TX13.2.1 Mechanical/Structural Integrity Testing